inadequate way of our few described North American species. The geographical and bathymetrical distribution are then given, but the work is strongest, as one would naturally expect, in the anatomy and histology of these creatures. The nervous and muscular systems are elaborately discussed, and especially the biology of these Crustacea, which is treated of under the heads of habitats, symbiosis, mimicry and sympathetic coloring, play of chromatophores, sensibility to external influence, duration of life, molting, walking and swimming habits; parasites, etc., and phylogeny. The illustrations are numerous and excellent.

THE GEOLOGICAL RECORD FOR 1878.[1]—It is a pity that the appearance of a work of this description should be delayed nearly four years beyond the natural time of publication. The editor apologizes for the great delay in the appearance of the volume by non-arrival of the MS. of the sections America and Arctic Regions from the sub-editor of those sections. Mr. E. Wethered has undertaken, however, in future to edit the section America. Still the volume is a little larger than its predecessors, containing over 3530 entries. The list of contributors to the present volume is a long one, numbering forty-five, and the list of journals and works referred to fills twenty closely printed pages.

After giving the titles, sometimes with a very brief synopsis of works and articles on the stratigraphical and descriptive geology of different countries, those of articles on physical geology, applied and economic geology, petrology, mineralogy, palæontology, maps and sections, and miscellaneous and general geology follow in the order given. There is also a supplement for the period from 1874 to 1877 at the end of each of the above divisions.

Of course to the working geologist such a record as this must prove invaluable. The editors promise that hereafter the yearly issues will be more prompt and complete.

GEOLOGICAL SURVEY OF OHIO.[2]—The fourth volume of this survey contains reports upon the mammalia of the State, by A. W. Brayton; upon the birds, by J. M. Wheaton; upon the reptiles and amphibia, by W. H. Smith, and upon the fishes, by D. S. Jordan. The first report contains little that is new. The probability that the wild cat (*Lynx rufus*) is extinct in Ohio is stated; but of the wolf no more recent particulars are given than quotations from Dr. Kirtland, who speaks of it as very rare in 1838, and from Hildreth (Pioneer History of the Ohio Valley), who remarks that in 1848 it was nearly extinct.

Nothing is stated with regard to the abundance or even the present occurrence within the State of the gray fox; the fisher is

[1] *The Geological Record for 1878.* An account of works on geology, mineralogy and palæontology, published during the year, with supplements for 1874–1877. Edited by WILLIAM WHITAKER and W. H. DALTON. London, 1882. 8vo, pp. 496.

[2] *Report of the Geological Survey of Ohio.* Volume IV. Zoölogy and Botany. Columbus, O., 1882.

said to be "almost unknown in the Middle States;" nothing is said of the abundance or scarcity of the ermine, mink or skunk, and the same defect of localization is evident throughout. The badger "formerly extended to Ohio," and the black bear was abundant in 1805. The reader will search in vain for facts not contained in older works.

The section devoted to birds is far better. It commences with an account of the topography of the State, and in every case mentions the season at which the species appears, the localities it prefers and its abundance or scarcity. Details respecting the mode of nesting, eggs, food and habits are also systematically given. The Carolina parrot was formerly a visitor, but has not made its appearance for several years. The golden eagle is occasional, and the white-headed eagle abundant in some localities. A black vulture (*Cathartes atratus*) was observed in 1877. The white pelican is a not rare spring and fall migrant; the double-crested cormorant occurs but rarely; the Florida cormorant breeds in the State, and several gulls and terns frequent Lake Erie. The check list gives 292 species, of which only six are considered accidental. A bibliography of Ohio ornithology; a dissertation upon the relation between latitude and coloration, in which the author asserts, after a careful comparison, "that the pattern of coloration in the adults of our Northern birds is the same as that found in the young of allied Southern birds," and a glossary, conclude this section.

Ohio supports thirty-six species of reptiles and twenty-five batrachians. Of these, three are lizards and thirteen tortoises. *Lygosoma laterale* is included on the authority of Dr. Kirtland; *Cistudo clausa* and *Emys meleagris* are said to be rare; the copperhead occurs along the waters of the Mahong, Big Beaver and Muskingum rivers, and near Cleveland; *Eutænia proxima* is rare; *Tropidonotus erythrogaster* has not been seen in the State by the writer; the hog-nose snake is occasional in the north-eastern part of the State and in Scioto valley, and *Pityophis melanoleacus*, *Ophibolus calligaster*, *O. doliatus*, *Coluber obsoletus*, *Cyclophis æstivus*, *Diadophis punctatus* and *Carphophis amœnus* are rare.

Of the Batrachia, *Chorophilus triseriatus* is rare, *Hyla pickeringii* is included solely on the extent of its extra-limital range, and *Spelerpes longicaudus* is rare. The genera Desmognathus and Gyrinophilus, though possessing well-marked characters, are not admitted, but are included in Plethodon and Spelerpes. Dr. Smith notes the occurrence of *Menobranchus lateralis* in the Hudson, and gives the authorities for the statement, that when its gills have been nibbled off by small fish, it can survive by cutaneous and pulmonary respiration.

In the introduction to this section several curious particulars with regard to food are given. The bull-frog will vary its insect regime by eating mice and its own species, and *Rana halecina* has

also cannibalistic habits. A toad has been observed to breakfast upon nine wasps, and dine upon eight more. It does not swallow bees and wasps immediately, but first presses them to death between its jaws, and thus avoids their sting. Insects and snails form, however, the principal food of the amphibians of the State, as well as of the lizards and smaller turtles. The danger from venomous snakes is much exaggerated, as out of the few bitten three out of four get well. This department is less valuable than the others on account of the author's manifest unacquaintance with the nature of the higher systematic analysis. The only valuable statements in this field are copied from other authors without credit. This is especially true of the Urodela, although the author states that "the classification and description" is taken "from the author's printed thesis" on this subject.

Dr. Jordan enumerates 163 species of fishes, of which forty may be considered characteristic of the lake fauna, and sixty-seven of that of the Ohio, while the remainder are common to both. This portion of the report is in every respect up to date, containing the results of the writer's own researches as well as those of other workers, and is rendered interesting by accounts of the habits of such fish as are valued by sportsmen, culled from the various sporting papers.

The entire report is much disfigured by typographical errors. Jordan is repeatedly written Jordon, *rugchos* and *rhugchos* are specimens of compositors' Greek for a snout, Lopophanes does duty for Lophophanes, sagittale sports an extra g, and so on.

KING'S ECONOMIC RELATIONS OF WISCONSIN BIRDS.—This essay forms chapter XI of the report of Professor T. C. Chamberlain, State Geologist of Wisconsin, and has been prepared by Mr. F. H. King, assistant on the Survey. It comprises 269 pages of the report and is thus rather a voluminous contribution to a subject which is attracting much attention in this country, and which is one of much practical as well as biological interest. Now that our birds are described and the systematist's work is about completed, their life-histories, habits and relations to their environments are subjects still fresh and novel, and much remains to be done towards harmonizing the discordant views held as to the value of birds as insect-destroyers. The materials for the facts recorded by Mr. King were obtained from an examination of the contents of the stomachs of over 1800 birds, 1608 of which contributed results which have been incorporated in this report. From the 1608 stomachs examined the *disjecta membra* of 7663 insects were obtained. Part of his work was done in Jefferson county, Wis., and part at Ithaca, N. Y.

Mr. King estimates, from of course imperfect data, the bird population of Jefferson county at sixty-six per square mile and that of Ithaca at one hundred and fourteen per square mile. "This would give for Jefferson county a total bird population of